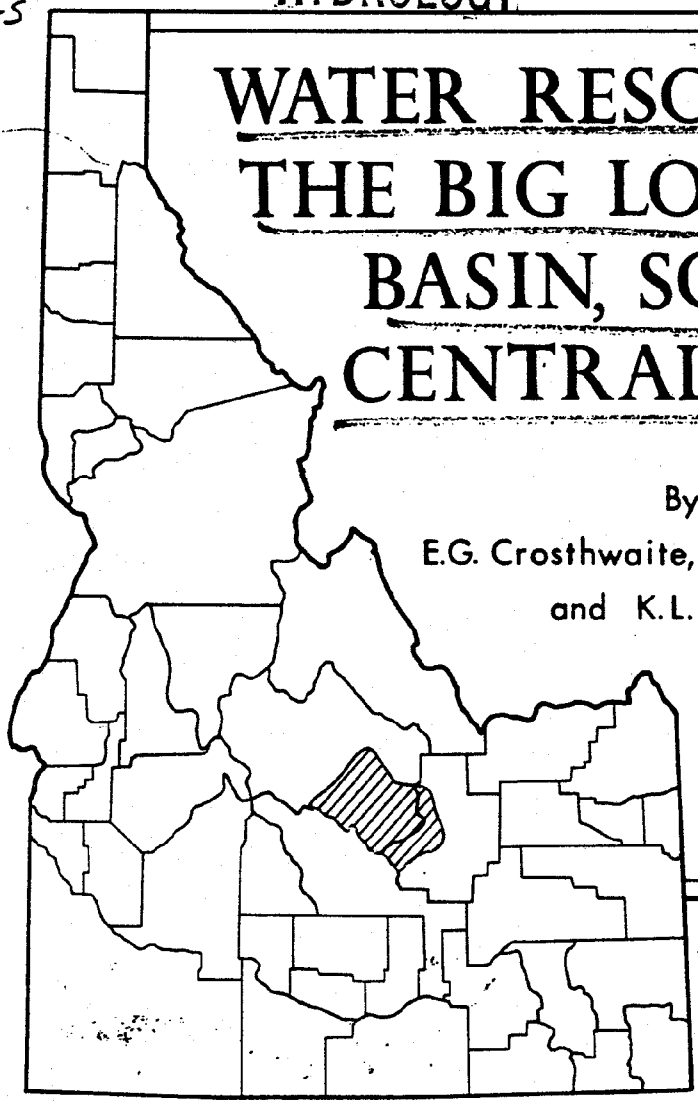
HYDROLOGY

WATER RESOURCES IN THE BIG LOST RIVER BASIN, SOUTH CENTRAL, IDAHO



By
E.G. Crosthwaite, C.A. Thomas,
and K.L. Dyer

OPEN-FILE REPORT 70-93

UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WATER RESOURCES DIVISION

Prepared in cooperation with the
IDAHO DEPARTMENT OF RECLAMATION

Boise, Idaho
1970

U.S. ~~Geol. Surv~~. Geo Survey - Water Res. Div.

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
Water Resources Division

WATER RESOURCES IN THE BIG LOST RIVER BASIN, SOUTH-CENTRAL IDAHO

By

E. ... d K. L. Dyer

... the
...ion

Boise, Idaho
1970

CONTENTS

CONTENTS

ILLUSTRATIONS

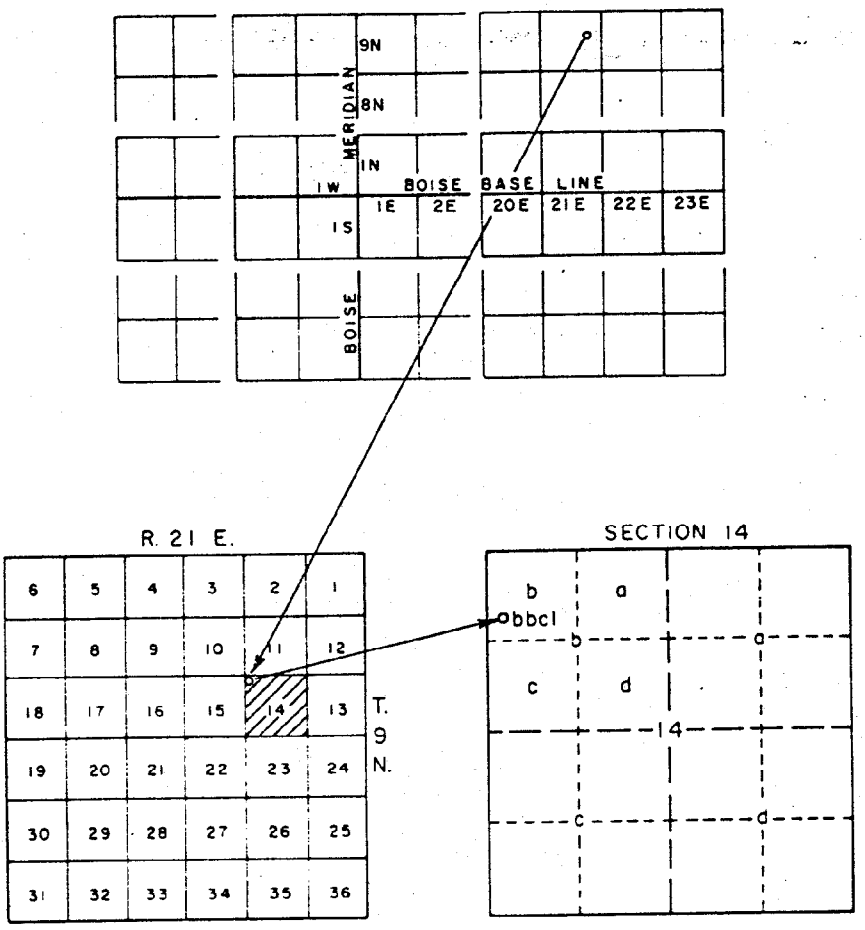


FIGURE 2.-- Diagram of the well-numbering system.

(Using well 9N-21E-14bbcl).

as a part of a study of the Snake River Plain, estimated the average annual outflow from the basin to be 330,000 acre-feet.

The first measurement of streamflow was made by the U.S. Geological Survey in December 1903 at the gage site below Mackay Reservoir, near Mackay (1270). Since that time the Survey has operated gaging stations at 25 other sites in the basin for various lengths of time. In addition, a large number of miscellaneous measurements of discharge are in the files of the Survey, and the Lost River Irrigation District has measured many streams and canals during the course of the District's distribution of irrigation water. The U.S. Weather Bureau has collected temperature and rainfall data for significantly long periods at several sites since the first record began at Arco in 1894. The U.S. Soil Conservation Service has collected data on snow depth and water content of snow at a number of locations, the longest record dating back to 1936.

Much geologic mapping has been done in part of the Lost River Range (Ross, 1947) and in the mining areas in Copper Basin and the White Knob Mountains (Nelson and Ross, 1968, and Nelson, in press). General geologic mapping has been done west of the longitude of Leslie (Ross, 1963) and reconnaissance mapping has been done in the eastern part of the basin (Ross, 1963, and Mapel, written commun., 1969).

DATA COLLECTED

Although a large body of hydrologic and geologic data were available at the start of this study, many additional data were required to fulfill the purposes of this report. Beginning in the summer of 1966, continuous-record gages were operated on Lower Cedar Creek above diversions, near Mackay (1289); Alder Creek below South Fork, near Mackay (1298); and Antelope Creek above Willow Creek, near Darlington (1309). Additional miscellaneous measurements were made on tributaries and the main stem of Big Lost River in water years 1966-68. Ground-water levels were measured periodically in 30 wells. Additional water-level measurements were made in about 200 wells, and other well data were collected. Six wells were drilled to collect geologic and hydrologic data, and seismic, gravity, and resistivity surveys were made at key sites in the basin by the Regional Geophysics Section,

U.S. Geological Survey. Eight precipitation-storage gages were operated in mountainous parts of the basin in cooperation with the U.S. Weather Bureau.

Unless noted otherwise, the average figures for water yield, much of the streamflow and precipitation data and other hydrologic data given in this report have been adjusted to the 25-year base period 1944-68.

CULTURE

Agriculture, dependent on irrigation, is the principal economic resource of the basin. Most of the nonirrigated area, including the mountainous terrain, is used primarily for production of beef cattle and sheep. Principal crops grown are seed potatoes, hay, and grain. Enterprises related to outdoor recreation provide considerable income to residents of the basin. Mining and logging are of minor importance.

Arco and Mackay are the principal towns with populations of 1,562 and 652, respectively, according to the 1960 census (U.S. Bureau of Census, 1961). The total population of the basin was about 4,360 in 1960.

WATER USE

The dominant use of water in the basin is for irrigation. Most irrigation water is supplied from surface sources. Table 1 shows the acreage of land irrigated by surface water and by ground water in segments of the basin. There are four irrigation wells above Mackay Reservoir and 175 wells below the reservoir. When surface-water supplies are short, ground water is pumped to supplement needs for part of the land, principally downstream from Mackay Reservoir, supplied by the canal system.

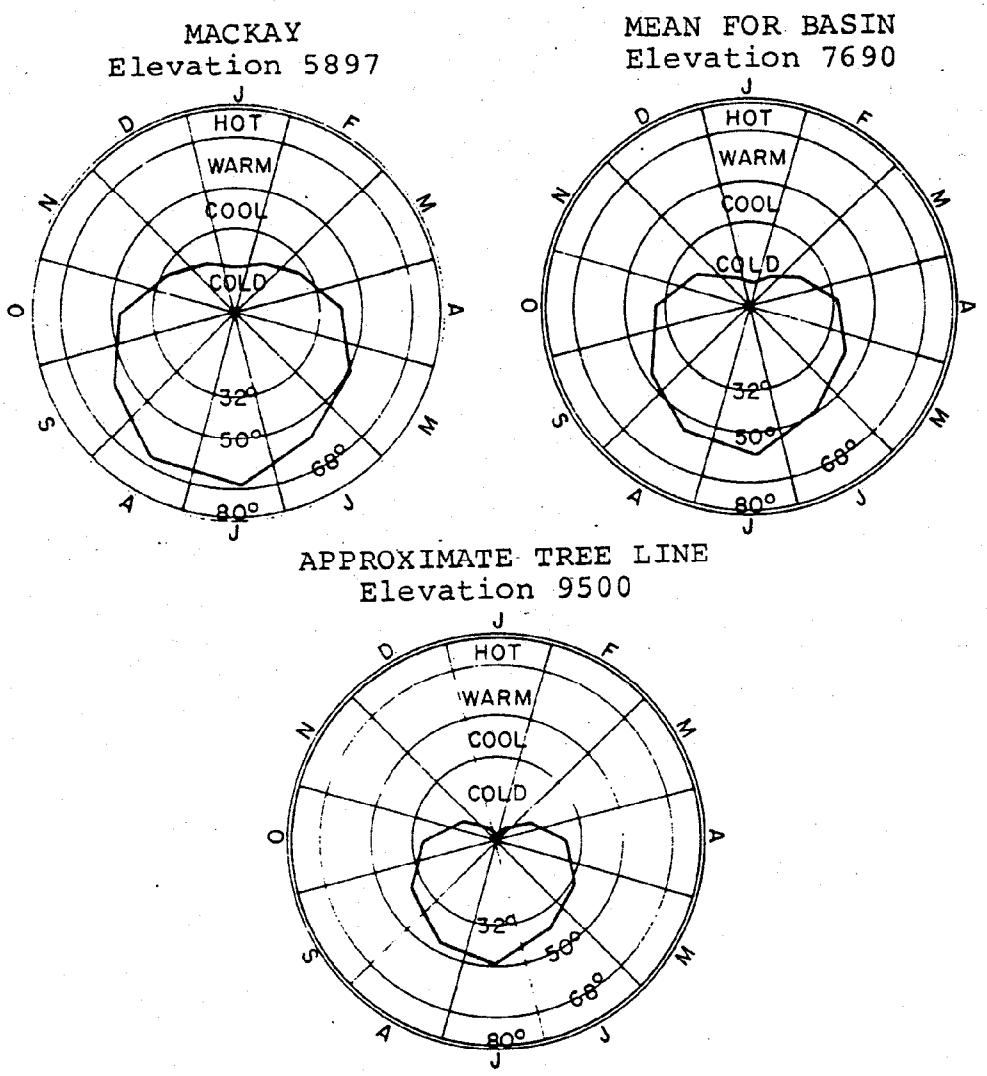
All municipal and practically all domestic water supplies are provided by wells and springs. Streams are the primary source of supply for livestock on the grazing lands.

Table 1. Irrigated and nonirrigated crop lands in Big Lost River basin.[a]

Location	Acres irrigated: Surface water	Acres irrigated: Ground water	Non-irrigated[b] crop land
Along Big Lost River basin above Mackay Reservoir, including Warm Springs Creek	10,840	200	1,000
Along tributaries above reservoir	1,840		
Thousand Springs Valley			9,150
Along Big Lost River below reservoir	29,340	8,300	8,155
Antelope Creek	6,200		
Alder Creek	1,000		
Totals (rounded)	49,000	8,500	18,000

a Data from Soil Conservation Service and Big Lost River Irrigation District.

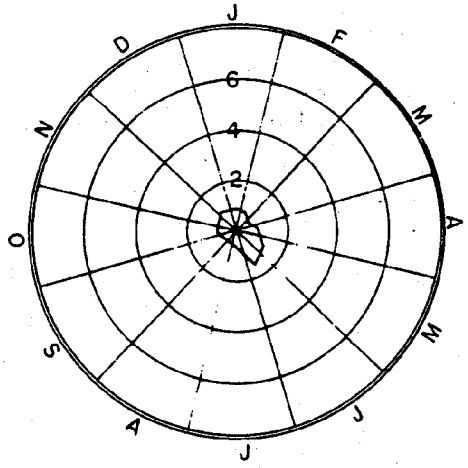
b Locally called subirrigated land because the water table is near the land surface.



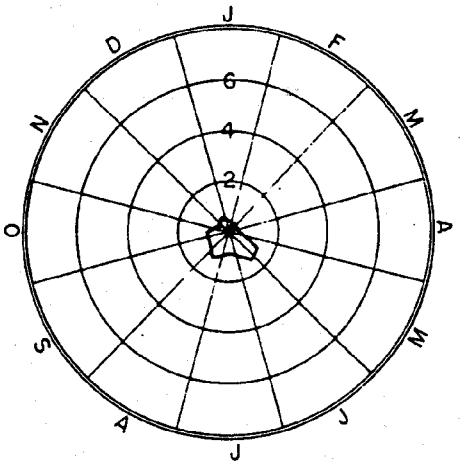
TEMPERATURE, IN DEGREES FAHRENHEIT, AND
ELEVATION, IN FEET ABOVE MEAN SEA LEVEL

FIGURE 4.-- Monthly mean temperatures at selected elevations in Big Lost River basin.

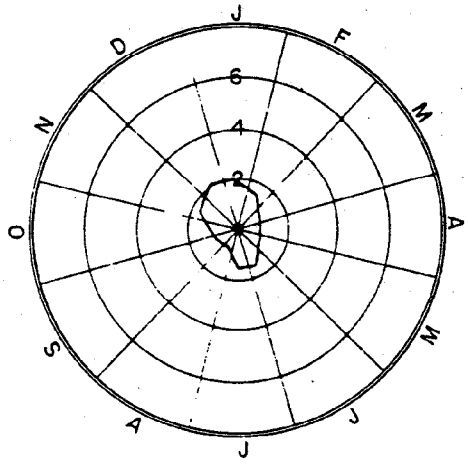
ARCO, 1944-68
Elevation 5300



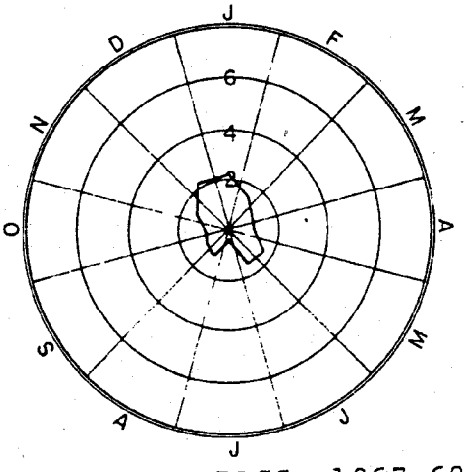
CHILLY-BARTON FLATS, 1944-68
Elevation 6140



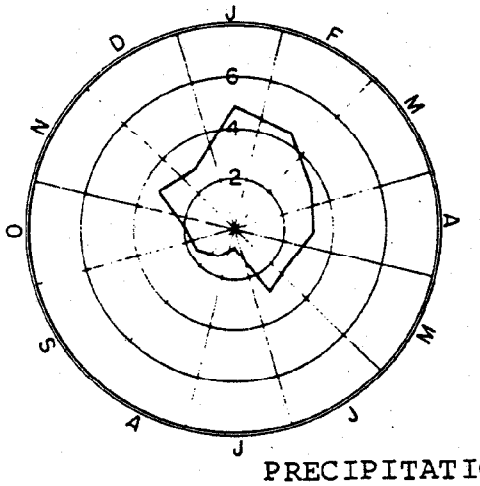
SUN VALLEY, 1944-68
Elevation 5821



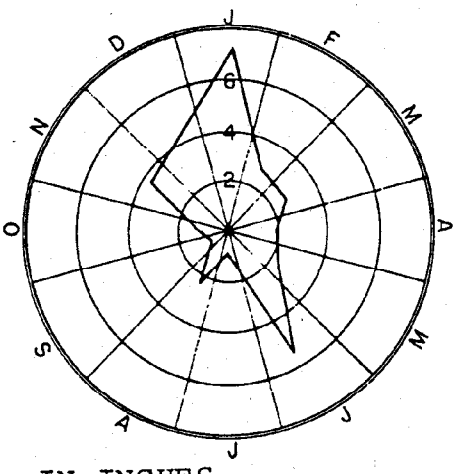
CRATERS OF THE MOON, 1959-68
Elevation 5897



GALENA, 1962-67
Elevation 7300



LEATHERMAN PASS, 1967-68
Elevation 9800



PRECIPITATION, IN INCHES
ELEVATION, IN FEET ABOVE MEAN SEA LEVEL

FIGURE 5.-- Monthly distribution of precipitation at selected sites in and near the Big Lost River basin. (Average for years as shown).